

51.1 NEG—Two's Complement Negation

Opcode	Instruction	Description
F6 /3	NEG <i>r/m8</i>	Two's complement negate <i>r/m8</i>
F7 /3	NEG <i>r/m16</i>	Two's complement negate <i>r/m16</i>
F7 /3	NEG <i>r/m32</i>	Two's complement negate <i>r/m32</i>

Description

Replaces the value of operand (the destination operand) with its two's complement. (This operation is equivalent to subtracting the operand from 0.) The destination operand is located in a general-purpose register or a memory location.

Operation

```
IF DEST = 0
    THEN CF ← 0
    ELSE CF ← 1;
FI;
DEST ← - (DEST)
```

Flags Affected

The CF flag cleared to 0 if the source operand is 0; otherwise it is set to 1. The OF, SF, ZF, AF, and PF flags are set according to the result.

Protected Mode Exceptions

#GP(0)	If the destination is located in a nonwritable segment. If a memory operand effective address is outside the CS, DS, ES, FS, or GS segment limit. If the DS, ES, FS, or GS register contains a null segment selector.
#SS(0)	If a memory operand effective address is outside the SS segment limit.
#PF(fault-code)	If a page fault occurs.
#AC(0)	If alignment checking is enabled and an unaligned memory reference is made while the current privilege level is 3.

Real-Address Mode Exceptions

#GP	If a memory operand effective address is outside the CS, DS, ES, FS, or GS segment limit.
#SS	If a memory operand effective address is outside the SS segment limit.

Virtual-8086 Mode Exceptions

#GP(0)	If a memory operand effective address is outside the CS, DS, ES, FS, or GS segment limit.
#SS(0)	If a memory operand effective address is outside the SS segment limit.
#PF(fault-code)	If a page fault occurs.
#AC(0)	If alignment checking is enabled and an unaligned memory reference is made.

51.2 NOP—No Operation

Opcode	Instruction	Description
90	NOP	No operation

Description

Performs no operation. This instruction is a one-byte instruction that takes up space in the instruction stream but does not affect the machine context, except the EIP register.

The NOP instruction is an alias mnemonic for the XCHG (E)AX, (E)AX instruction.

Flags Affected

None.

Exceptions (All Operating Modes)

None.

51.3 NOT—One's Complement Negation

Opcode	Instruction	Description
F6 /2	NOT <i>r/m8</i>	Reverse each bit of <i>r/m8</i>
F7 /2	NOT <i>r/m16</i>	Reverse each bit of <i>r/m16</i>
F7 /2	NOT <i>r/m32</i>	Reverse each bit of <i>r/m32</i>

Description

Performs a bitwise NOT operation (each 1 is cleared to 0, and each 0 is set to 1) on the destination operand and stores the result in the destination operand location. The destination operand can be a register or a memory location.

Operation

$DEST \leftarrow NOT\ DEST;$

Flags Affected

None.

Protected Mode Exceptions

#GP(0)	If the destination operand points to a nonwritable segment. If a memory operand effective address is outside the CS, DS, ES, FS, or GS segment limit. If the DS, ES, FS, or GS register contains a null segment selector.
#SS(0)	If a memory operand effective address is outside the SS segment limit.
#PF(fault-code)	If a page fault occurs.
#AC(0)	If alignment checking is enabled and an unaligned memory reference is made while the current privilege level is 3.

Real-Address Mode Exceptions

#GP	If a memory operand effective address is outside the CS, DS, ES, FS, or GS segment limit.
#SS	If a memory operand effective address is outside the SS segment limit.

Virtual-8086 Mode Exceptions

#GP(0)	If a memory operand effective address is outside the CS, DS, ES, FS, or GS segment limit.
#SS(0)	If a memory operand effective address is outside the SS segment limit.
#PF(fault-code)	If a page fault occurs.
#AC(0)	If alignment checking is enabled and an unaligned memory reference is made.

